

CLAIMS

1. A particle beam generator, suitable for use in nanometre technologies, comprising an extracting plate, having an extracting aperture, disposed adjacent a particle source and operable to extract particles from such a source into the extracting aperture to form a particle beam, particle accelerating means operable to accelerate the extracted particles to increase the energy of the beam, and collimating means operable to collimate the particle beam, characterised in that at least one of the extracting aperture and the accelerating means inhibits lateral expansion of the particle beam to provide a near parallel particle beam having a diameter less than 100 nm
2. A particle beam generator, as claimed in Claim 1, further comprising focussing means operable to provide, from the laterally inhibited particle beam, a focussed particle beam having a diameter less than 1nm.
3. A particle beam generator as claimed in Claims 1 or 2, wherein the diameter of the extracting aperture is substantially between 5 nm and 500 nm.
4. A particle beam generator as claimed in Claim 3, wherein the diameter of the extracting aperture is substantially between 5nm and 100nm.
5. A particle beam generator as claimed in any of the preceding claims, wherein the particle accelerating means comprises a plurality of accelerator plates arranged in a

stack and electrically isolated from each other, each accelerator plate having an aperture arranged to share a common longitudinal axis with the extracting aperture to form an extended accelerating aperture along which the extracted particles are accelerated on application of a voltage between the extractor plate and a first accelerator plate and between each pair of successive adjacent accelerator plates arranged in the column thereafter.

6. A particle beam generator as claimed in Claims 1 to 4, wherein the extracting plate is a first conductor which is separated from a second conductor by at least one of a resistive and insulator material, and the accelerating means comprises an accelerating aperture which extends from the extractor aperture through the at least one of the resistive and insulator material and through the second conductor, wherein the extracted particles are accelerated on application of a differential voltage between the first and second conductors.
7. A particle beam generator as claimed in Claim 6, wherein the resistance of the at least one of the resistive and insulator materials is substantially between $1\text{ k}\Omega\text{-cm}$ and infinity.
8. A particle beam generator as claimed in Claims 5 to 7, wherein the diameter the accelerating aperture is substantially between 10nm and $1000\mu\text{m}$.
9. A particle beam generator as claimed in any of the preceding claims, wherein the collimating means is integrally formed with the accelerating means.

10. A particle beam generator as claimed in Claim 9 wherein the collimating means comprises a conical integrally formed in the wall of the accelerating means, the conical having a diameter increases in the direction of the accelerated beam.
11. A particle beam generator as claimed in Claims 9 and 10, wherein the collimating means comprises at least one aperture having a lesser diameter relative to the accelerating aperture and is disposed on the longitudinal axis thereof.
12. A particle beam generator as claimed in any of the preceding claims, comprising a particle source integrated therewith.
13. A particle beam generator as claimed in Claim 12, wherein the particle source is a field emission source.
14. A particle beam generator as claimed in any of the preceding claims, adapted for use with an electron particle source.
15. A particle beam generator as claimed Claims 1 to 13, adapted for use with an ion particle source.
16. A near field microscope comprising a particle beam generator as claimed in any of the preceding claims.

17. A microchip comprising a particle beam generator as claimed in claims 1 to 15.